EXTERIOR NOISE ANALYSIS REPORT

CLUB ESTATES
TM 5499

Pauma Valley, CA

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SECTION 1 INTRODUCTION AND SUMMARY

This report estimates the exterior noise environment at the outdoor usable areas of Tentative Map (TM) 5499 in the community of Pauma Valley, in the County of San Diego, California (Figure 1). The project would subdivide the property into 31 residential lots.

The project site is along State Route 76 (SR-76). Surrounding land uses include a residential community and a golf course to the south, and vacant/agricultural land uses in all other directions. The primary noise source near the project is vehicular traffic on SR-76.

Future exterior noise levels at the outdoor usable areas without the residential structures or grading would range from approximately 47 dBA CNEL at Lot 14 to approximately 62 dBA CNEL at Lot 1.

1.1 EXTERIOR NOISE MITIGATION

Future exterior noise levels from vehicular traffic would exceed 60 dBA CNEL at the usable open space of Lot 1 without mitigation. The following mitigation is feasible to reduce the noise level at the outdoor usable area of Lot 1 to below 60 dBA CNEL:

- A one-story residential structure on Lot 1 at the location shown on Figure 4.

This conclusion is contingent upon the following noise control design elements:

- Existing orange trees remaining between the potential Caltrans trail and the building pads of Lots 1-6, as shown on Figure 4; and
- Grading for building pads, as shown on Figure 4.

1.2 INTERIOR NOISE MITIGATION

Because the future sound level at the façades of the buildings on Lot 1 and 2 may exceed 60 dBA CNEL, an interior noise analysis must be provided to and approved by the County prior to obtaining a building permit. This analysis should identify sound transmission loss requirements for building elements exposed to exterior noise levels exceeding 60 dBA CNEL. If the interior 45-dBA CNEL limit can be achieved only with the windows closed, the residence design must include mechanical ventilation that meets applicable Uniform Building Code (UBC) requirements. Specific acoustical treatments for windows and/or doors may be required.

1.3 NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound typically associated with human activity and that interferes with or disrupts normal activities. The human environment is characterized by a certain consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels. If a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the human ear's sensitivity within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Because community noise fluctuates over time, a single measure called the Equivalent Sound Level (Leq) is often used to describe the time-varying character of community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-

square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

Another sound measure known as the Community Noise Equivalent Level (CNEL) is an adjusted average A-weighted sound level for a 24-hour day. It is calculated by adding a 5-dB adjustment to sound levels during evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dB adjustment to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). These adjustments compensate for the increased sensitivity to noise during the typically quieter evening and nighttime hours. The CNEL is used by the State of California and the County to evaluate land-use compatibility with regard to noise.

SECTION 2 APPLICABLE NOISE STANDARDS

2.1 COUNTY OF SAN DIEGO GENERAL PLAN

The following is taken from the Noise Element of the County General Plan.

Policy 4b

Because exterior community noise equivalent levels (CNEL) above 60 decibels and/or interior CNEL above 45 decibels may have an adverse effect on public health and welfare, it is the policy of the County of San Diego that:

1. Whenever it appears that new *development* may result in any (existing or future) *noise sensitive land use* being subject to *exterior noise* levels of CNEL equal to 60 *decibels (A)* or greater, an acoustical analysis shall be required.
2. If the acoustical analysis shows that *exterior noise* levels at any *noise sensitive land use* will exceed CNEL equal to 60 *decibels (A)*, modifications shall be made to the development which reduce the *exterior noise* level to less than CNEL of 60 *decibels (A)* and the *interior noise* level to less than CNEL of 45 *decibels (A)*.
3. If modifications are not made to the *development* in accordance with paragraph 2 above, the *development* shall not be approved unless a finding is made that there are specifically identified overriding social or economic considerations which warrant approval of the *development* without such modification; provided, however, if the acoustical analysis shows that *exterior noise* levels for any *noise sensitive land use* will exceed CNEL equal to 75 *decibels (A)* even with such modifications, the *development* shall not be approved irrespective of such social or economic considerations.

Definitions, Notes & Exceptions

"*Decibels (A)*" refers to A-weighted sound levels as noted on page VIII-2 of this Element.

"*Development*" means any physical development including but not limited to residences, commercial, or industrial facilities, roads, civic buildings, hospitals, schools, airports, or similar facilities.

"*Exterior Noise*":

(a) For single family detached dwelling projects, "exterior noise" means noise measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:

(i)	Net lot area up to 4,000 square feet:	400 square feet
(ii)	Net lot area 4,000 square feet to 10 acres:	10% of net lot area
(iii)	Net lot area over 10 acres:	1 acre

(b) For all other projects, "exterior noise" means noise measured at all exterior areas which are provided for *group or private usable open space* purposes.

(c) For County road construction projects, the *exterior noise* level due to vehicular traffic impacting a *noise sensitive land use* should not exceed the following values:

(i)	Federally funded projects:	The noise standard contained in applicable Federal Highway Administration standards.
(ii)	Other projects:	60 decibels (A), except if the existing or projected noise level without the project is 58 decibels (A) or greater, a 3 decibel (A) increase is allowed, up to the maximum permitted by Federal Highway Administration standards.

"*Group or Private Usable Open Space*" means usable open space intended for common use by occupants of a *development*, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways (Group Usable Open Space) and usable open space intended for use by occupants of one dwelling unit, normally including yards, decks and balconies (Private Usable Open Space).

"*Interior Noise*": The following exception shall apply: For rooms which are usually occupied only a part of the day (schools, libraries, or similar), the interior one-hour average sound level, due to noise outside, should not exceed 50 *decibels (A)*.

"*Noise Sensitive Land Use*" means any residence, hospital, school, hotel, resort, library or any other facility where quiet is an important attribute of the environment.

SECTION 3 EXTERIOR NOISE ENVIRONMENT

The project site is along SR-76 (see Figures 1 and 2). The site is currently undeveloped except for one single-family residence. Approximately 25% of the site, that portion along SR-76, is used as an orange tree orchard. Surrounding land uses include a residential community and a golf course to the south, and vacant/agricultural land uses in all other directions. The primary noise source near the project is vehicular traffic on SR-76. The existing (2005) ADT on this roadway is 7,000 vehicles (SANDAG, 2007). The topography of the site reduces in elevation from SR-76 to the south.

3.1 SOUND LEVEL MEASUREMENTS

One 1-hour sound level measurement and simultaneous traffic count were conducted during the morning peak traffic period to quantify the existing onsite acoustical environment and to calibrate the traffic model. Agencies such as the U.S. Department of Housing and Urban Development consider the peak hour sound level reasonably equivalent to the CNEL for vehicular traffic.

A Larson Davis Model 820 American National Standards Institute Type 1 Integrating Sound Level Meter was used as the data-collection device. The meter was mounted on a tripod roughly 5 feet above ground to simulate the average height of the human ear. The measurements were performed on Friday, August 11, 2006, between 7:00 and 8:00 a.m. The meter was calibrated before and after the measurement period.

The measurement results are summarized in Table 2 and correspond to the locations depicted on Figure 3. A review of the table shows that the measured sound level was 73.3 dBA Leq at ML1. Other noise sources during the measurements included faint pump noise at adjacent property and wind through the orange trees.

3.2 FUTURE NOISE ENVIRONMENT

The primary noise sources in the future would continue to be vehicle traffic on SR-76. The future (Year 2030) ADT would be 15,000 vehicles (SANDAG, 2006).

The Federal Highway Administration's Traffic Noise Model (TNM) version 2.5 was used to calculate future traffic noise levels. The model was calibrated using actual traffic counts and sound level measurements. Actual sound levels varied from modeled sound levels by approximately 1.7 dBA. No correction was applied to the model. The vehicular traffic calculations are summarized in Appendix A.

It was assumed that peak hour traffic volume would be 10% of the ADT. The vehicle mix was 85% cars, 10% medium trucks, and 5% heavy trucks, based on field observations. The model assumed "lawn" site sound propagation conditions. The average vehicle speed was assumed to be 60 miles per hour based on field observations.

The orange trees on the project site would remain. A homeowners' association would be formed to provide for the operation and maintenance of private infrastructure within the proposed project. The homeowners' association would include a separate cost center that would affect only the Grove Lots (Lots 1, 2, 3, 4, 5, 6, 20, 21, 22, 23, 29, and 30). The Grove Lots would be charged with all liabilities related to the grove and would enjoy all of the direct benefits of the grove. The homeowner's association would

contract with a grove operator, whose costs would be chargeable to only the Grove Lots. Similarly, only the Grove Lots would enjoy the benefit of the income derived from fruit sales. The Rancho Pauma Mutual Water Company would provide irrigation water to the grove from a single meter at very competitive rates. Given the current operating costs and income derived from grove operation, the developer expects that income would continue to exceed costs, even when the size of the grove is somewhat reduced to accommodate homes on the Grove Lots. Thus, the grove would continue to be economically viable, and would continue to be not only a direct asset to the Grove Lots, but an amenity and asset to the entire project community. New trees would be planted where needed on the Grove Lots to replace trees removed during grading where permanent loss is not necessary, and to replace diseased trees over the coming years, if any trees become diseased to the extent that they need to be removed.

Caltrans may construct a trail along the south side of SR-76, on the project property (Figure 4). If realized, the implementation of the trail may remove the trees within the trail, and possibly those between the trail and the roadway.

The noise attenuating effect of the orange trees was factored into the model. A 15-foot-high tree zone between the trail and the building pads of Lots 1-6 was included in the model (Figure 4). Pictures of the existing orange grove, from the north side of SR-76 and looking south, are included in Appendix B.

There would be no multi-story houses; there would be covenants, conditions, and restrictions (CC&Rs) recorded against the development portion of the project site that restrict all structures to a single story.

Figure 2 illustrates the site plan and the unmitigated (without walls, structures or grading) 60 dBA CNEL contour at a first-floor elevation. Calculations show that a portion of Lots 1-6 would be exposed to future exterior noise levels over 60 dBA CNEL. All other lots would be exposed to future exterior noise levels below 60 dBA CNEL.

Acoustical calculations were performed with the presence of a one-story (15-foot-high) house in the building envelopes of Lots 1-6 and the top and toe of the slope formed by the building pad cut (Figure 4). The calculations show that at least 10% of the net lot area of Lots 1-6 would be usable open space exposed to future exterior noise levels below 60 dBA CNEL.

Future exterior noise levels from vehicle traffic would not exceed 60 dBA CNEL at the usable open space area of any lot. Table 3 presents exterior sound levels at outdoor usable areas for each lot. Figure 4 shows the usable open space area of each lot.

SECTION 4 FINDINGS AND MITIGATION

4.1 EXTERIOR NOISE MITIGATION

Future exterior noise levels from vehicular traffic would exceed 60 dBA CNEL at the usable open space of Lot 1 without mitigation. The following mitigation is feasible to reduce the noise level at the outdoor usable area of Lot 1 to below 60 dBA CNEL:

- A one-story residential structure on Lot 1 at the location shown on Figure 4.

Noise Control Design Features

The following noise control design features were included in the traffic noise model. The results of the analysis are contingent upon these elements:

- Existing orange trees remaining between the potential Caltrans trail and the building pads of Lots 1-6, as shown on Figure 4; and
- Grading for building pads, as shown on Figure 4.

4.2 INTERIOR NOISE MITIGATION

Because the sound level could exceed 60 dBA CNEL at building façades on Lots 1 and 2, an interior noise analysis for these lots must be provided to and approved by the County prior to obtaining a building permit. This analysis should identify sound transmission loss requirements for building elements exposed to exterior noise levels exceeding 60 dBA CNEL. If the interior 45-dBA CNEL limit can be achieved only with the windows closed, the residence design must include mechanical ventilation that meets applicable UBC requirements. Specific acoustical treatments for windows and/or doors may be required.

SECTION 5 REFERENCES

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